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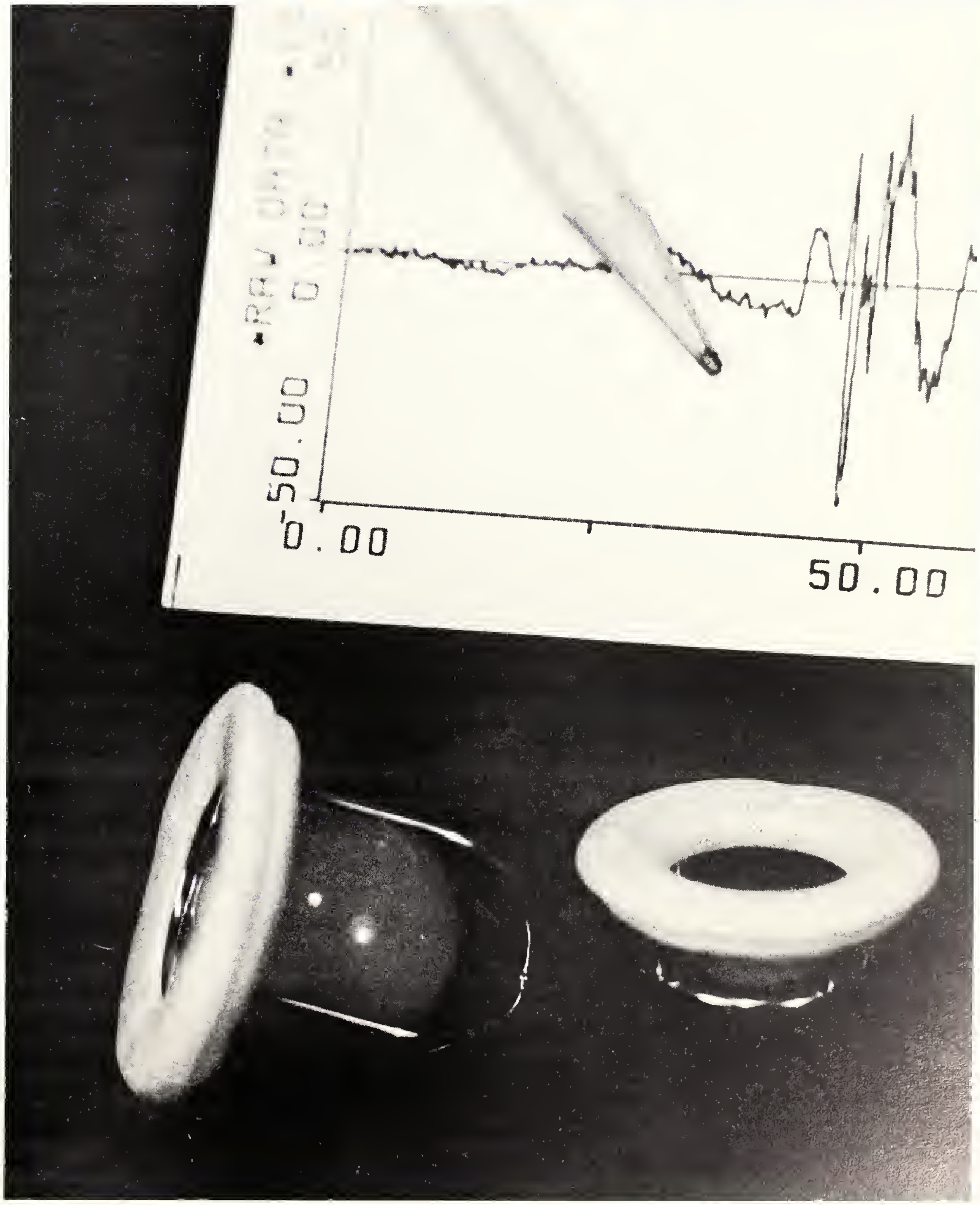

COMPUTERNEWS

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Cover Story

This month's cover photo by Thanos Kaponeridis illustrates disk- and ball-type heart valves, used as implants in humans. The background is a computer-produced graph from CSS. The valves were supplied by Toronto General Hospital's Public Relations Office.

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VALVES AND WAVES: PORTRAIT OF A USER

It is a summer morning in 1976. Picture a physicist named Hart Katz sitting in the Toronto subway, reading a local newspaper article about heart valve studies at Toronto General Hospital. Hart knows about *big* valves. He externally monitored the structural health of valves inside pipes for Ontario Hydro at Pickering.

Hart extrapolated.

Curious and practical, he decided to find out if he could measure and study inner valve health in *people*, just as he had measured it in huge pipes - by strapping a microphone on the outside to record and listen to sounds inside.

Hart explored.

Picture the Communications and Small Systems lab in the Sandford Fleming building at U. of T. It's a hot, summer afternoon in 1976 and Krishna Patnaik, Operations Supervisor, finds himself face to face with Hart Katz, who now needs a computer.

Hart: I've offered physicians at Toronto General Hospital a method of checking on the condition of heart valves that have been implanted in people. (You can't do open-heart surgery to periodically check on how the valves are holding up - it's too dangerous.) So I'm going to record valve sounds externally and then analyze them using a computer......

Krishna: Well, you've come to the right place. It sounds as though you need an interactive, graphics facility... such as CSS. We'll give you a PDP-11 to play with.

Hart: I know a couple of other systems. Could someone help me to learn this one, so I can do my own programming?

Krishna: Absolutely.

Hart: My approach is basically going to be this:

- I have to collect my data, my waves.
- I have to design a program to isolate the sound of the valve clicking. I don't want stomach gurgles or the heart sound itself or the sounds of body movement.
- I have to store my findings.
- Then I have to design another program to analyze these stored sounds. I need signal processing.

Krishna: Like I said Hart, you've come to the right place.

It's now 1980. Funded by grants, Hart Katz continues to collect data for heart valve studies. As a private consultant using CSS, he continues to design, develop and debug for his clients.

About once a week he collects 4 or 5 new patients who have had a faulty heart valve replaced with a metal implant. Hart places a microphone on the subject's chest and tapes to get a base line. He then waits, to monitor the decay of these artificial valves. Made of titanium, they're tough and resistant - but the body can be a hostile environment and will break down even metal.

Basically, the valves are one-way, shaped like a round donut with a disk or ball in the hole. A cage attached to the donut keeps the disk from escaping. There are two problems inherent in their use:

- blood tends to clot around the valve;
- the actual disk gets eaten away by the system or gets jagged, bent and even possibly escapes!

The former is acceptable, to a point. However, if the built-up clot breaks away and stops somewhere else, death ensues. Hence, the extreme importance of being able to know the structural condition of such implants.

continued...

VALVES AND WAVES continued

An innocuous technique like Hart's, which is non-invasive and doesn't involve needles, medication etc., can pinpoint a build-up of tissue or valve corrosion. Present conjecture allows that (since a new valve hits once per beat) the more wobbly rebounds per beat that are detected, the sicker the valve is.

One particular obstacle, overcome after the initial 6 months of interactive experimentation, was the sound of the heart itself. An actual heartbeat tracing is just an acoustic lub-dub, lub-dub ... etc. People with valves produce a click lub-dub, click lub-dub..... Hart had to design an analytical process to strip away the heart sound. But even before that he had to *locate* the heartbeat! He had to get the computer system to scan through and locate a beat.

In individual recordings - three minutes of heartbeats, amounting to approximately 250 beats - the actual click lasts about one one hundredth of a second. Hart also had to get the system to scan through and locate the click of a valve. (He ultimately designed a rejection algorithm to get rid of stomach sounds.)

Successes to date have shown that this investigative technique complements other methods of determining valve health, namely chemical and blood methods. The future promises continuing change. With all his programs now built and running, Hart sees the next six months as more automated, more production-oriented. Since most of his time to date has been spent in the development of programs, he wants the coming months for 'running' the patients. (On the other hand, he acknowledges the inevitable programming enhancements that evolve from daily work on projects such as his.) Hart envisions a situation in which the analysis of data is *automatic*. He wants to be able to translate his tape recorder tapes into computer or digital tapes and then to 'turn on' the procedure at 8 p.m. so as to have results in the morning! Reading results, in this case, must be as automatic as reading X-rays.

As well as using CSS facilities for heart valve research, Hart also uses the lab to investigate Sudden Infant Death (SID) syndrome or crib death. Death is apparently due to a failure of the respiration mechanism. He became involved with an ongoing, computerized study out of the Hospital for Sick Children in Toronto where a signal processing approach was taken to study the ventilation wave form. Basically the project involves studying the breathing of sleeping infants to see if one can analyze data and come up with something indicative of defects in their respiratory control systems.

It seems appropriate to conclude with 'quotable quotes' from Hart Katz - on everything from computers in general to CSS to his own sincere feelings:

- *What am I doing (computing)? I'm playing with an expensive cash register, that's all I'm doing.*
- *CSS? I appreciated being able to go in there any time to work. At some computer centres you have to sell your mother to get in there for an hour.*
- *For me it's tremendously satisfying to be able to do this sort of work. It's very satisfying; it's very challenging. And at the same time, I know that it's going somewhere.*

Pat Longstaff Smith

DOCUMENTATION AVAILABLE AT UTCS

For the benefit of our users, the following is a stock list of computer manuals and supplies currently available in the **Information Office,** Room 206, Engineering Annex building.

In addition to these titles, special orders can be made for computer-related material. All orders may be paid by Customer Account Number (CAN), cheque or cash. Please phone the Information Office at 978-4990 for current prices.

Title	**Form No.**
Access Method Services OS/VS2	GC26-3841
ANS Cobol Language	GC28-6396
APL-SF Program Reference	D10-LPLSA
Assembler Language	GC33-4010
Assembler Prog. Guide	GC33-4021
ATMS Terminal User Guide	S320-1325
ATMS-III Quick Reference Card	GX20-2354
ATMS-III Terminal Operator's Ex/Reference Guide	SH20-2426
ATMS-III Terminal Operator's Guide	SH20-2425
BASIC Reference Card	D10-XBRCA
BMDP Manual (1979)	
Cobol Prog. Reference (DEC)	D10-LCPRA
Cobol Reference Card (DEC)	D10-OCRCA
Coding Form (Assembler & Fortran)	
Data Management Services Guide	GC26-3874
Data Management Macro Instructions	GC26-3873
Decwriter II Pinnacle Ribbon	
Diablo Print Wheel	
Diskette	
Fortran Interactive Debugging Reference Card	SX28-8193
Fortran IV (G) & (H) Prog. Guide	GC28-6817
Fortran IV Language	GC28-6515
Fortran Prog. Reference (DEC)	AA-0944E
Hytype I Ribbons	
Hytype II Ribbons	
Job Control Language (MVS)	GC28-0692
Linkage Editor & Loader	GC26-3813
Linkage Editor & Loader Messages	GC38-1007
Macro Assembler Reference	D10-LMCOA
Message Library: System Codes MVS	GC38-1008
MVS Overview	GC28-0984
Operating System Commands (DEC)	
PDP 11 Processor Handbook	
PDP 11 Programming Card	
PL/1 Check. Compiler Programming Guide	SC33-0007
PL/1 Optimizing & Check. Language Reference Card	SX33-6002
PL/1 Optimizing & Check. Language Reference	SC33-0009
PL/1 Optimizing Compiler Prog. Guide	SC33-0006
Principles of Operation for S/370	GA22-7000
S/370 Reference Summary	GX20-1850
SAS Programmer's Guide	
SAS Supp. Library User's Guide	
SAS 1979 User's Guide	
Sharp APL Reference Manual	
Sharp APL: A Minicourse	
Sort/Merge Programmer's Guide	SC33-4007
SPSS Manual	
SPSS Update	
Supervisor Services & Macro Instructions	GC28-0683
System Messages (MVS)	GC38-1002
TSO Command Pack: Guide & Reference	SC28-0748
TSO Reference Summary Card	GX28-0647
TSO Command Language Reference	GC28-0646
TSO PL/1 Checkout Compiler	SC33-0033
TSO PL/1 Optimizing Compiler	SC33-0029
TSO Terminal User's Guide	GC28-0645
TSO-3270 SPF General Information	GH20-1974
TSO-3270 SPF Program Reference	SH20-1975
USERBOOK Sections	

continued...

DOCUMENTATION AVAILABLE continued

Utilities Manual (DEC)	D10-UTILA
Utilities Messages (MVS)	GC26-3920
Utilities (MVS)	GC26-3902
Wylbur Reference Manual	
Wylbur Tutorial	

SCSS RELEASE 4.2

Release 4.2 of the SPSS Conversational Statistical System (SCSS) is now available on the DECsystem-1090. To access, simply type 'r scss'. This is a moderate enhancement of the package and brings with it a new manual much in the style of the excellent SPSS manual. Copies of the new manual have been ordered and will be available from the Information Office.

There are a number of new features and enhancements in release 4.2, including two new procedures:

1. The SCATTERPLOT procedure is capable of generating various plots on the terminal, including overlay plots of more than one variable on the vertical axis and use of a 'third' variable to control the symbol plotted for a given case.
2. The CASELIST procedure can be used to list cases at the terminal or create a file with case values.

Among other enhancements and new facilities are:

- variable by variable data entry from the terminal
- elementary file merging capabilities
- the ability to enter data for single variables to an existing file
- Comment text can be added to listings and logs.
- Blanks can be distinquished from zeros in raw data.
- Some statistics like the Durbin-Watson test for residuals have been added.

Users having questions about this new release of SCSS are invited to contact their Computing Services Representative (CSR).

John Roth

PERSONNEL CHANGES

This month Mark Tapia has moved to the Communications and Small Systems (CSS) lab.

His replacement in Academic Services is John Mavity, the new time-sharing CSR who previously worked as a part-time advisor at UTCS.

John Roth, formerly with Applications Support Group (ASG) has also transferred to CSS.

Thanos Kaponeridis has rejoined CSS after several months of travel in Europe.

Shirley Manimalethu joined Operations as a DEC-10 operator as has Sam Pun. Glen Thompson has left UTCS for employment elsewhere.

Theresa Veira

RECENT ACQUISITIONS IN THE DCS LIBRARY

Ansorge, Rainer et al, eds.
Numerical mathematics.
Basel, Birkhauser Verlag, 1979.

Hammerlin, Gunther, ed.
Numerische Integration: Tagung im Mathematischen Forschungsinstitut, Oberwolfach, Okt. 1978.
Basel, Birkhauser Verlag, 1979.

IFIP TC-8 Working Conference on Formal Models and Practical Tools for Information Systems Design, Oxford, Eng., 1979.
Formal models and practical tools for information systems design, ed. by Hans-Jochen Schneider.
Amsterdam, North-Holland, 1979.

Logsdon, Thomas S.
Computers and social controversy.
Potomac, Md., Computer Science Press, 1980.

McCracken, Daniel D.
A guide to NOMAD for applications development.
Wilton, Conn., National CSS Inc., Feb. 1980.

Ullman, Jeffrey D.
Principles of database systems.
Potomac, Md., Computer Science Press, 1980.

Wait, R.
The numerical solution of algebraic equations.
Chichester, Eng., Wiley, 1979.

UTCS SYSTEMS

3033/N8A PROCESSOR

- located in McLennan Physical Laboratories
- provides General Purpose Job Stream, High Speed Job Stream, TSO, WYLBUR
- 8 megabytes of memory
- MVS with JES2

3033/N8B PROCESSOR

- located in McLennan Physical Laboratories
- provides administrative IMS/VS DB/DC Batch, TSO, MVS/APL and ATMS services
- 8 megabytes of memory
- MVS with JES2

DECSYSTEM-10 Model 1090

- located in Sandford Fleming
- provides General Purpose Time-Sharing
- 256 K - 32 bit words of memory
- TOPS-10 operating system

COMMUNICATIONS & SMALL SYSTEMS (CSS)

- located in SF106
- DEC GT44 System with PDP-11/40 CPU
- 2 Z80 based microcomputers
- Radio Shack TRS-80
- Western Digital Pascal MicroEngine
- Apple II Plus
- DEC GT40 System with PDP-11/05 CPU
- provides specialized graphics and interactive graphics
- provides online and real-time computing services, data acquisition and minicomputer services

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Sylvia May (External)	EA206	7148
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Marg Doherty	EA209	3960
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Michelle Mulé	EA206	8703
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Walter Rosocha	SF105	7087
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Zelda Anderson	HU405	5273
Keypunching		
Dale Wright	MP368	4565

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Administrative Services	MP368A	6693

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New Physics		
Bob Chambers	MP1202	8823
External		
Ihor Prociuk	SG205	6875,6885

Supervisors, Operations

Paul Scarborough (IBM 3033N8A)	MP335	6220
Krishna Patnaik (DEC-1090 & CSS)	SF106	4086
Dave Wong (IBM 3033N8B)	MP335	6864

Key:

EA = Engineering Annex

SG = 49 St. George

HU = 215 Huron St.

MP = McLennan Physical Laboratories (New Physics)

SF = Sandford Fleming

SS = Sidney Smith

Job and System Status Queries

SYSTEM/3033,TSO	7373
ATMS/APL	6234

Time-Sharing Services	**Dial-Up**
APL,ATMS	7200 Centrex 7201 Non Centrex
TSO,WYLBUR	6200 Centrex 6201 Non Centrex
DEC-10 Services	4224 Centrex 4244 Non Centrex
PHONE-IN ADVISING	6465

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